

REMARKS

This paper is responsive to an Office Action dated February 27, 2006. Prior to this response, claims 14-8, 11-12, 16-21, and 23-24 were pending. Claims 4-8, 11-12, 16-21, and 23-24 remain pending.

The Office Action states that claim 24 was never introduced as a new claim and is, therefore, withdrawn from consideration. In response, the Applicant notes that claim 24 was initially introduced in the Applicant's response mailed on August 22, 2005. Enclosed as an Attachment is a copy of the response. The response shows that claim 24 was included as a "new" claim in the claims section of the response on page 8. On page 9, the Remarks Section also notes that a new claim 24 is being introduced. The Attachment also includes a copy of a check for \$200 that was presented to pay for new independent claim 24.

Section 1 of the Office Action states that claims 4-6, 8, 11-12, 16-18, 20, and 23 have been allowed.

Section 2 of the Office Action states that claims 7 and 19 have been rejected as unpatentable under 35 U.S.C. 103(a) with respect to Riccardi et al. ("Riccardi"; US 2004/0150052), in view of Hammond et al. ("Hammond"; US 6,900,094) and Fitzgerald (2006/0011983). The Office Action acknowledges that Riccardi fails to disclose the use of a high-k dielectric as a gate insulator. The Office Action states that Hammond discloses the use of a high-k gate dielectric and that Fitzgerald discloses a surface channel with a thickness of 2 to 30 nanometers. The Office Action states that it would have been obvious to include the high-k dielectric of Hammond, and the thickness taught by Fitzgerald, with Riccardi, to

increase device reliability and performance. This rejection is traversed as follows.

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, there are three requirements to establish a *prima facie* case of obviousness.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck* 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

Generally, Riccardi describes a buried channel transistor. N-well 6 and P-well 7 are formed in an epi layer 3 (i.e., a single-crystal Si layer 3), see Fig. 1. Channel regions 12 and 20 are formed in the epi layer between the source and drain regions [0031-0032]. The channel regions 12/20 are formed a preselected distance from the upper surface 5 of the epi layer.

Generally, Hammond describes a surface channel device formed on a heterostructure substrate (Abstract). Hammond defines a heterostructure substrate as a strained Si substrate formed from a relaxed SiGe layer formed over a bulk or epi Si layer. A (strained) Si layer is formed over the relaxed SiGe layer (col. 2, ln. 65 through col. 3, ln. 3). Fig. 1 shows a Si layer 12, a relaxed SiGe layer 14, a strained Si layer 16, a second SiGe layer 18, and a second strained Si layer 20 (col. 3, ln. 23-

27). Fig. 10 shows a buried channel device 44 and a surface channel device 46, where channels are formed in the strained Si layer 16.

Generally, Fitzgerald discloses a buried channel device 660 and a surface channel device 650, formed from a graded SiGe layer 606 and a relaxed SiGe layer 604 [0036]. The description of Fig. 6 is incomplete. The Applicant assumes that channels are formed in layer 602, but layer 602 is undefined. Based on the explanations of Figs. 1A and 1C, the Applicant assumes that layer 602 is strained Si. Fig. 8A is similar to Fig. 6, but a buried SiO₂ layer 880 is disclosed [0041-0042]. Fig. 9 describes a buried Ge channel [0044].

With respect to the first *prima facie* requirement, the Office Action states that it would be obvious to combine elements from the different references "in order to have a surface channel device with increased reliability and performance." However, neither the references nor the Office Action provide any guidance as to how the references can be combined. Riccardi describes a channel made in an epi Si layer. Hammond and Fitzgerald describe forming a channel in a strained Si layer overlying a SiGe layer. The Applicant respectfully submits that extensive research and development is associated with lattice matching when SiGe layers formed adjacent to Si layers, and a person with ordinary skill in the art would not look to strained Si/SiGe substrate devices to make changes to a device formed upon an epi Si substrate.

The motivation to combine references cannot be build upon the laudatory goals of improved reliability and performance. These goals appear to be a justification to support a retrospective analysis. That is, the prior art references appear to be combined merely as a result of a search using elements of the Applicant's claims as keywords. Rather, the

motivation to combine must be built upon some specific feature from one reference that suggests a modification to a specific feature in another reference.

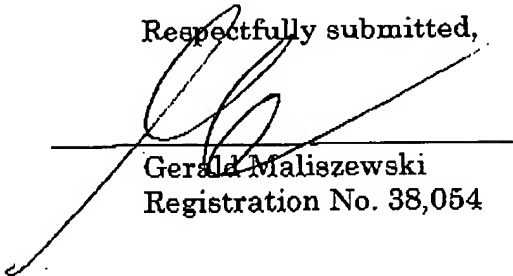
Viewed from a different perspective (the second *prima facie* requirement), even if an expert were given the Riccardi, Hammond, and Fitzgerald disclosures as a foundation, there is no reasonable expectation for success in building the claimed invention metal oxide surface channel device. That is, there is no evidence to suggest that elements from strained Si/SiGe substrates (Hammond and Fitzgerald) could be used to modify a *buried* channel device fabricated on a Si substrate with an epi Si active layer (Riccardi), in a manner that makes a metal oxide *surface* channel device (the claimed invention) obvious.

With respect to the third *prima facie* requirement, even if the three prior art references are combined, that combination does not disclose all the elements of the claimed invention. The Office Action states that Riccardi discloses all the elements of claims 7 and 19, except the high-k dielectric gate insulator. However, this is an inaccurate statement. Claims 7 and 19 describe a surface channel made from a metal oxide material. Since Riccardi's channels are formed in the epi layer, the channels are necessarily an epi material (i.e., Si). Likewise, Hammond and Fitzgerald describe surface channels formed in a strained Si layer. Therefore, none of the references explicitly disclose a metal oxide surface channel. Since the prior art references do not explicitly describe, or suggest the use of a metal oxide surface channel, the combination of references do not describe all the elements of claims 7 and 19, and the Applicant requests that the rejection be withdrawn.

It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

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Respectfully submitted,


Gerald Maliszewski
Registration No. 38,054

Customer Number 55,286
P.O. Box 270829
San Diego, CA 92198-2829
Telephone: (858) 451-9950
Facsimile: (858) 451-9869
gerry@ipatentit.net